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1 "Deblistering Apparatus"

2

3 The present invention relates to deblistering
4 apparatus and a deblistering process.

5

6 Pharmaceutical tablets and the like are frequently
7 sold in 'blister packs'. Blister packs are designed
8 to provide a number of tablets or the like together,
9 and are generally formed by having a number of
10 blisters, one for each tablet or the like, and some
11 form of substantially flat 'lid'. Increasingly, the
12 lid includes some form of metal 'foil', so as to (a)
13 increase the child-resistance of such packs being
14 openable, and (b) to provide a better seal over the
15 blisters to prevent as far as possible contamination
16 of the tablet and the atmosphere in the blisters
17 prior to use.

18

19 For various reasons, such as for instance incorrect
20 filling, wrong batch labelling or specific
21 formulation requirements, it is desired to deblister
22 the tablets from the pack, especially where the

1 tablets are valuable and can be reused.
2 Deblistering of tablets from a 'push-through'
3 blister pack is generally carried out by passing the
4 packs through rollers. For the more sealed nature
5 of child-resistant packs, deblistering of tablets
6 from such packs requires cutting of the foil lid
7 prior to pushing out the tablet from the blister.

8
9 The generality of this operation is shown in
10 US4428709. However, the machinery shown in
11 US4428709 only relates to individual cutting and
12 punching along a strip of blister packages in ribbon
13 form. Our WO 00/27709 describes a rotary
14 deblistering apparatus, whereby blister packs in
15 their more usual form can be automatically loaded
16 onto a rotary drum, and the cutting and deblistering
17 carried out at separate stations as the drum rotates
18 to accommodate further blister packs in an automatic
19 operation.

20
21 However, it is often desired to be able to extract
22 the contents of a single blister pack. This does
23 not require the more sophisticated machinery shown
24 in WO 00/27709. Moreover, it is often desired to be
25 able to use the same machinery to extract the
26 tablets from different patterns, sizes and shapes of
27 blister packs.

28
29 It is an object of the present invention to provide
30 a simple but effective apparatus and process adapted
31 to provide quick and efficient single blister pack
32 extraction.

1 According to one aspect of the present invention,
2 there is provided apparatus for deblistering a
3 pharmaceutical blister pack having a number of
4 product blisters and a lidding material thereover,
5 the apparatus comprising a pack holding means
6 adapted to hold the blister pack and means to
7 transfer the pack into and out of alignment with an
8 operating position, the operating position having a
9 lidding material cutting means and a blister
10 punching means on opposing sides thereof.

11

12 The lidding material is generally in the form of a
13 foil, often including one or more layers of metallic
14 material. The lidding material creates a 'lidded'
15 or 'sealed' or 'closed' arrangement with the
16 blisters.

17

18 The pack holding means is preferably adapted to
19 match the configuration of the design of the pack to
20 be deblistered. More preferably, the pack holding
21 means has a series of complementary indentations or
22 holes corresponding to the blisters of the pack to
23 be deblistered. The holes could extend through the
24 pack holding means to its other face.

25

26 The pack holding means preferably retains the
27 blister pack either through position, friction or
28 additional retaining or restraining means until the
29 empty blister pack is ready to be discarded. Such
30 retaining or restraining means includes any
31 pneumatic or mechanical arrangement, such as an over
32 plate.

1 In one embodiment of the present invention, the pack
2 holding means is retained by a plate transfer means,
3 which transfer means is adapted to provide the
4 movement of the pack holding means into and out of
5 alignment of the operating position. The transfer
6 means could comprise any form of mechanical
7 arrangement, preferably including means to confirm
8 the alignment of the pack holding means into and out
9 of the operating position. Such means includes
10 guide rails and pins and the like, and the transfer
11 means may be an arm or a piston or the like having
12 reciprocal motion.

13

14 The pack holding means and any plate transfer means
15 may be moveable in and out of alignment of the
16 operating position in 1, 2 or 3 dimensions, for
17 example linearly, arcuately, etc, either as one
18 movement or single action, or in a number of
19 discrete or articulated movements or actions.

20

21 The packing holdings means and/or the plate transfer
22 means may also be formed of a number of connected
23 parts, one or more of which may serve to help guide
24 and/or hold such means during their movement.

25

26 In another embodiment of the present invention, the
27 pack holding means is adapted to rotate when out of
28 alignment with the operating position. Preferably,
29 the rotation is provided by rotation of the transfer
30 means along its axis of movement. Rotation of the
31 pack transfer means allows its position to be

1 adapted to suit the user, and/or loading and/or
2 unloading of the blister pack.

3
4 The lidding material cutting means generally
5 comprises a number of cutting pieces such as studs
6 having means to cut through lidding material at the
7 operational end of each piece. The pieces may be
8 attached to a general carrier plate so as to be
9 simultaneously operable. The pieces are preferably
10 arranged in a pattern which is complementary to the
11 position of the blisters on the pack to be
12 deblistered. Preferably, the cutting means is
13 changeable. The cutting means may be changeable by
14 the introduction of different patterned cutting
15 plates the different blister arrangements, or by re-
16 patterning of the pieces on a general carrier plate.

17
18 The cutting means is moveable between a rest
19 position and a cutting position, which cutting
20 position involves the engagement of the cutting
21 means with the blister pack so as to wholly,
22 substantially or partly weaken or break through the
23 lidding material of the blister pack around each
24 blister as is known in the art.

25
26 The blister punching means comprises any known means
27 adapted to pressure the blisters of the blister pack
28 so as to force the contents of the blisters through
29 or past the lidding material. Generally, the
30 contents of the blisters will be collectable. The
31 punching means may comprise separate elements
32 adapted to individually punch each blister, or a

1 more general punch adapted to act directly or
2 indirectly on all blisters simultaneously. The
3 latter arrangement has the advantage of not
4 requiring changeability to act on different blister-
5 patterned blister packs.

6
7 The punching means may act directly or indirectly on
8 the blisters. The pack holding means may include
9 means to engage the blisters, which engagement is
10 controlled by the punching means.

11
12 In another embodiment of the present invention, the
13 blister pack is wholly or substantially in a
14 vertical position in the operating position, such
15 that the contents of the blisters will fall away
16 from the blister pack due to gravity once
17 deblistered.

18
19 According to second aspect of the present invention,
20 there is provided a method of deblistering a
21 pharmaceutical blister pack having a number of
22 product blisters covered by a lidding material,
23 comprising the steps of:

24
25 locating the blister pack on a pack holding means
26 having complementary pockets corresponding to the
27 blisters of the blister pack,

28
29 transferring the pack holding means into an
30 operating position in alignment with a lidding
31 material cutting means and a blister punching means,

32

1 wholly, substantially or partly cutting the lidding
2 material by activation of the cutting means,
3
4 deblistering the contents of the product blisters by
5 engagement of the blister punching means such that
6 the contents are without the blister pack, and
7
8 moving the deblistered blister pack out of alignment
9 with the operating position.

10

11 An embodiment of the present invention will now be
12 described by way of example only and with reference
13 to the accompanying diagrammatic drawings in which:

14

15 Figure 1 is a schematic perspective view of
16 apparatus according to one embodiment of the present
17 invention;

18

19 Figure 2 is a second schematic perspective view of
20 the apparatus of Figure 1 with the pack holding
21 means out of alignment with the operating position;

22

23 Figures 3a-3d are a series of schematic side views
24 of the cutting and punching operations of the
25 apparatus of Figure 1;

26

27 Figures 4a-4c are plan and two side view of the pack
28 holding means shown in Figure 1; and

29

30 Figure 5 is a schematic perspective view of
31 apparatus according to another embodiment of the
32 present invention.

1
2 Referring to the drawings, Figure 1 shows very
3 schematically the principle of the present
4 invention.

5
6 The present invention provides a single cutting and
7 punching station for a pharmaceutical blister pack.
8 These operations can be carried out whilst the
9 blister pack is stationary, and so in alignment with
10 the means for cutting and punching. This provides
11 simplicity of arrangement of the features of the
12 invention, and the minimal number of moving parts to
13 effect deblistering of the blister pack.

14
15 In Figure 1, there is schematically shown a lidding
16 material cutting means 4 and a blister punching
17 control means 6 on opposing sides of a transfer
18 plate 2 having a pack holding means 10 therewith.
19 The pack holding means 10 is in an operating
20 position between the cutting means 4 and the
21 punching means 6, and is moveable by a ram 8 out of
22 this operating position alignment.

23
24 Figure 2 shows the pack holding means 10 out of
25 alignment by movement of the ram 8 and transfer
26 plate 2, and also rotation of the pack holding means
27 10 into a horizontal position as explained
28 hereinafter.

29
30 Figures 4a-4c show a pack holding means 10 in
31 detail. The pack holding means 10 is similar to
32 that shown in our WO 00/27709, the features of which

1 are incorporated herein by way of reference.
2 Generally, the pack holding means comprises a top
3 plate 14 having a series of apertures 12 therein,
4 the apertures 12 being patterned to be complementary
5 to the shape of the blister pack to be deblistered.
6 The apparatus of the present invention could be
7 provided with different pack holding means for
8 different patterned blister packs, or different top
9 plates.
10
11 Across the top of the top plate 14 is a blister pack
12 retainer frame 16 hinged along one side of the top
13 plate 14. The frame 16 is rotatable away from the
14 top plate 14 during loading or unloading of the
15 blister pack with the pack loading means 10, and
16 then rotatable down on top of the blister pack so as
17 to securely and firmly retain the blister pack
18 against the top plate 14 during use.
19 Attached to the top plate 14 via a shoulder bolt 18
20 is a bottom plate 20 biased away from the top plate
21 14 by two intermediate springs 22. Upstanding from
22 the bottom plate 20 are a series of eject pins 24
23 aligned with the pockets 12. The pins 24 are fixed
24 to the bottom plate 20 by holding screws 26.
25
26 Preferably, the pack holding means 10 is located
27 within the transfer plate 2 attached to the arm 8 by
28 press fitting or a simple catch mechanism, such that
29 the pack holding means 10 can quickly and easily be
30 changed for different patterned blister packs.
31

1 In use, a blister pack, having in this example ten
2 blisters in an arrangement of five X two, is located
3 on the pack holding means 10, and the frame 16
4 located over the blister pack in order to retain it
5 firmly against the top plate 14.

6
7 Preferably, the pack holding means 10 is in its
8 horizontal position as shown in Figure 2, so as to
9 make it easier for the user to locate the blister
10 pack on the pack holding means 10, both visually and
11 physically. The pack holding means 10 can then be
12 rotated through 90° by rotating the arm 8, so that
13 the pack holding means 10 is wholly or substantially
14 in the same plane as the cutting means 4 and
15 punching means 6.

16
17 The pack holding means 10 is then transferred into a
18 operating position by the arm 8 between the opposing
19 cutting means 4 and punching means 6 as shown in
20 Figure 1.

21
22 Turning to Figures 3a-3d, Figures 3a-3b show
23 movement of cutting means 4 towards to blister pack
24 30. The cutting means 4 comprises a plate 32 having
25 a series of studs 34 thereon, the distal ends of the
26 studs 34 having serrated edges in order to effect
27 weakening and/or complete cutting through the
28 lidding material of the blister pack 30 as shown in
29 Figure 3b.

30
31 Figure 3c shows retraction of the cutting means 4.

32

1 Figure 3d shows impact of the punching control means
2 6 on the pack holding means 10. The punching means
3 6 need only be a ram, arm or piston means able to
4 pressurise the base plate 20 as shown in Figure 3d.
5 Impacting the base of the bottom plate 20 forces it
6 towards the top plate 14, such that the pins 24
7 travel through the pockets of the blister pack 30
8 and mechanically push out the contents from the
9 blisters and allow them to fall away from the
10 blister pack 30. This arrangement provides an even
11 force of ejection across all the blisters.

12

13 The ejected contents of the blister pack will fall
14 by gravity beneath the operating position, and can
15 be collected by a convenient receptacle for use or
16 repackaging.

17

18 In this time, the pack holding means 10 has been
19 relatively stationary, other than the bottom plate
20 20 and pins 24. The pack holding means 10 is now
21 moved from the operating position between the
22 cutting means 4 and the punching means 6 by
23 operation of the ram 8.

24

25 The restraining frame 16 is then manually, or
26 preferably automatically, moved away from the top
27 plate 14, such that the deblistered blister pack can
28 fall away from or be taken away from the pack
29 holding means 10 to allow a new blister pack to be
30 loaded. Where the pack holding means 10 is in a
31 vertical position and the restraining frame 16 is

1 moved away, the deblistered blister pack may
2 inherently fall away from the pack holding means.

3

4 Figure 5 shows a second arrangement for a lidding
5 material cutting means 40, similar to the cutting
6 means 4 in Figure 1, and a moveable transfer plate
7 42. Like the transfer plate 42 in Figure 1, the
8 transfer plate 42 has a pack holding means 44
9 therewith. The transfer plate 42 is moveable
10 between an out of alignment position shown by arrow
11 A, and an operating position shown by arrow B. The
12 plate 42 is moveable between such positions on an
13 arcuate guide means such as two rails 46.

14

15 In use, the pack holding means 44 is in its
16 horizontal position shown by arrow A, for location
17 of a blister pack, again having a 5x2 arrangement,
18 to be loaded therein. The pack holding means 44 and
19 transfer plate 42 then travels along the guide rails
20 46 to the operating position shown by arrow B.

21

22 The movement of the transfer plate 42 and pack
23 holding means 44 between the positions shown in
24 Figure 5 could be associated with a hand-lever or
25 the like, which lever also moves between a
26 horizontal position and the operating position next
27 to the cutting means 40.

28

29 In the operating position, the pack holding means 44
30 and blister pack are aligned with studs 48 on the
31 cutting means 40. In a similar operation to that
32 shown in Figures 3a-d, the cutting means 40 moves

1 towards the blister pack to weaken and/or completely
2 cut through the lidding material of the blister
3 pack. The cutting means 40 is then retracted.
4
5 Thereafter, a punching means (not shown) which could
6 be similar to that shown in Figures 1-3d, or even
7 conjoined with the transfer plate 42, impacts the
8 base of the pack holding means 44 in a manner
9 similar to that shown in Figure 3d, such that pins
10 (not shown) in the pack holding means 44 travel
11 through the pockets of the blister pack and
12 mechanically push out the contents from the
13 blisters, allowing the contents to fall away and be
14 collected. The transfer plate 42 and pack holding
15 means 44 are then moved back out of alignment of the
16 operating position, shown by arrow A, from which the
17 emptied blister pack can be removed, and another
18 blister pack loaded.
19
20 The present invention provides a simple apparatus
21 having few moving parts for deblistering of a
22 blister pack. Only the pack holding means requires
23 significant movement into and out of alignment with
24 the cutting means and punching means, each of which
25 requires little movement in themselves to provide
26 their effect.